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**BOTANICAL OBSERVATIONS ON THE MEXICAN FLORA, ESPECIALLY
ON THE FLORA OF THE VALLEY OF MEXICO.**

BY JOHN W. HARSHBERGER, PH. D.

Leaving Philadelphia, Tuesday August 4, 1896, for a botanical excursion to Mexico, the capital of the Republic was reached Tuesday August 11th, at 6 p. m. Several stops were made en route, one at St. Louis, where the Missouri Botanical Garden was visited, and one at Eagle Pass, Texas, where Sunday was spent. During the sojourn in the City of Mexico, numerous botanical trips were made into the surrounding country in company with Mr. C. G. Pringle, to whom I extend my most hearty thanks for much kindness and suggestive help. The itinerary is herewith given.

ITINERARY.

August 12, 1896, (Wednesday).—Visited a number of the lots in the City of Mexico, where cattle and burros are allowed to roam at will, and where a number of interesting plants were collected.

August 13th, (Thursday).—Mr. Pringle, Tranquilino Duran, a Mexican boy, and the writer visited Salazar by the National Railroad. Salazar is situated on the crest of the western mountain ridge, known as the Sierra de las Cruces. Here was fought, in 1810, the battle between Hidalgo and the Spaniards, resulting in a victory for the patriots. Salazar is situated at an elevation of from 10,000 to 11,000 feet above sea level. Many cool springs gush from the hill-sides, mostly denuded of timber, and many alpine plants were found in the upland meadows.

August 15th, (Saturday).—Tlalpam was visited this day. In reaching this town, we passed through Cherubusco, made famous by the fight there between the Americans and Mexicans. Tlalpam is a quiet suburban town of some 7,000 inhabitants, fourteen miles south of the City of Mexico. There are many flower and fruit gardens hereabouts, for the supply of the city markets; important factories of cotton, woollen cloth and paper are in the neighborhood. The eastern road from Tlalpam leads to Lake Xochimilcho, where we gathered the several interesting aquatics found on and near the

chinampas. The botanist must needs hire a canoe to procure specimens. The town is a veritable Venice.

August 17, (Monday).—The town and hills of Guadalupe, the Cerro de Tepeyac and Cerro de Gachupines visited, and a number of noteworthy plants collected. Guadalupe, some three miles north of the capital, is reached by tram-cars from the Plaza Mayor, and is interesting on account of the Sacred Chapel of Nuestra Señora de Guadalupe.

August 18th, (Tuesday).—An interesting locality visited this day was that of LaCima near the summit of Ajusco at about 10,000 feet elevation. The hill above the Indian town afforded more plants than could be conveniently carried. The pedregal in the neighborhood also yielded a rich harvest.

August 20th, (Thursday).—This day was spent in the neighborhood of Tlalpam, where the fields and ditches yielded a rich supply of plants. The edge of the Tlalpam pedregal was visited, and the interesting plants of the northern portion of the lava-bed collected and noted.

August 22d, (Saturday).—Another trip was made to the Tlalpam pedregal and to the hills beyond. In the pedregal, *Senecio praecox* DC., *Cereus serpentinus* and *Wigandia* were noted, and specimens collected for future study at home.

August 25th, (Tuesday).—The pedregal of Tlalpam extending to Tizapan, the lava bed was visited in the neighborhood of that town. Here the plants were found in the same abundance as lower down the mountain side, so that the pedregal in all its parts may be said to be a veritable flower garden.

August 26th, (Wednesday).—The writer left the City of Mexico for the Mexican tropics, via the Mexican Railroad to Orizaba and Cordoba; the next few days were spent amid the tropical luxuriance of the Mexican flora. Epiphytic orchids and other interesting plants were collected about Orizaba and in the neighborhood of the waterfall called Rincon Grande.

August 29th, (Saturday).—Returned to the City of Mexico, where the plants collected in the tierra caliente were preserved, some in formalin, others by drying.

August 31st, (Monday).—Visited the Tlalpam pedregal on the Mexican, Cuernavaca and Pacific Railroad at a much higher elevation than formerly visited, at about 9,000 feet. Here Dahlias were found in the greatest profusion and abundance. Returning

down the mountain side after a rough tramp over the pedregal, we took a train for the City at Eslava, where a number of plants were found.

September 1st, (Tuesday).—Left the City of Mexico alone en route for Guadalajara via Irapuato, where a number of days (September 2d to September 5th) were spent. The celebrated barranca was visited in company with an Indian, and a number of plants collected.

September 5th–September 9, 1896.—This time was profitably spent in a trip to Tampico on the Gulf Coast.¹ En route the beautiful Tamasopo Cañon was admired, as also the extensive palm forests about Rascon and eastward. No botanical exploration of the country was made.

September 10, 1896.—Ciudad Juarez and El Paso were reached on the homeward journey. A hasty botanical survey was made of the hills about El Paso, but little of interest was found in the immediate vicinage of the town, because of the extreme dryness of the season.

TOPOGRAPHY AND GEOGRAPHY OF THE PLACES VISITED.

The Valley of Mexico, situated 7,350 feet above the level of the sea, is of an elliptical form with its long axis running in a north and south direction. The greatest length of the valley according to Orozco and Berra is from Cerro de Sincoque on the north to Cerro del Teutli on the southern border of Lake Xochimilcho, a distance of about 45 miles. The greatest breadth of the valley is from the Hacienda de los Morales, westward a distance of 21 miles. This most beautiful of basin-shaped valleys is walled in by high hills and lofty mountains on all sides. Sierra del Ajusco rises in a series of ridges and peaks to the south, the highest point the volcano of Ajusco, long since extinct, lifting its peak 13,612 feet above sea level. In the east, this ridge of mountains sinks, and forms between Amecameca and Ozumba, a broad saddle, over which passes the railroad from the capital to the State of Morelos. The eastern mountainous rim stretches itself as a mighty wall, separating the Valley of Anahuac from Pueblo. It culminates in the southeast in the volcanic peak of Popocatepetl (17,782 feet), and in Iztaccihuatl a long high broken mountain mass, 16,060 feet elevation. Contiguous to Iztaccihuatl, lying to the north, we find the continuous ranges called Cerro Telapon, Cerro Tlaloc, Cerro Tlamacas, Cerro Cha-

¹ See an article by the writer in Bot. Gazette, May, 1898, p. 362.

pingo and the small Sierra de Patlachique—to the east as an outlier in the Valley of Puebla, Monte de Rio Frio. These are all of volcanic origin. About the north foot of Cerro Tlamacas spread the the fruitful plains of Otumba and Apam. The railroad to Vera Cruz crosses here.

The enclosure of the Valley of Mexico is completed to the west by the Sierra de las Cruces, continued northward by the spurs called Monte alto and Monte bajo, and ending finally in the Sierra de Tepotzatlán and Cerro de Sincoque, separated from the northern range of hills by the railroad cut and drainage ditch, Tajo de Nochistongo. The floor of the valley is generally level and uniform with six large lakes filling the more depressed portions. Their size and elevation in metres and square kilometers is given in the subjoined table :

	Area.	I, 1862.	II, 1868.
Lake Texcoco.	182,495 sq. km.	—1,907 m.	—0.85 m.
Lake Chalco.	104,985 sq. km.	+1,175 m.	+2.16 m.
Lake Xaltocan.	54,072 sq. km.	+1,567 m.	+2.05 m.
Lake Xochimilcho	47,050 sq. km.	+1,202 m.	+2.16 m.
Lake Zumpango.	17,205 sq. km.	+4,155 m.	+5.75 m.
Lake San Cristobal	11,060 sq. km.	+1,690 m.	+2.05 m.
	416,867 sq. km.		

The relative elevation, minus or plus, has been referred to the base of one of the corners of the National Palace on the Plaza Mayor, as the zero level. During the diluvial period of geologic time the lakes were very much more extended than now. The whole Valley of Mexico was filled by a large inland sea with here and there a volcanic hill rising, as an island, or as a peninsula, out of its surface. Texcoco was in the past quite saline. Fernando Cortez in a letter to Charles V, dated 1500, says: “ En el dicho llano (del Valle de Mexico) hay dos lagunas, que casi lo ocupan todo. E la una de estas lagunas es de agua dulce, y la otra, que es mayor, es de agua salada.” The earth of the plains surrounded Texcoco Lake is impregnated with salt, and in many places the saline material forms a rich efflorescence. The flora of this region of the valley has a marked character. Various species of *Chenopodium*, *Atriplex*, *Salsola* and *Grati-*

ola are found growing here as saline plants. The chinampas are the so-called floating islands, more especially found in Lake Xochimilcho.

A number of small conical volcanoes rise from the floor of the valley, and are known locally as Cerro de taza (cupped hill, Kuppen). One remarkable collection of these low hills is to be found in the neighborhood of the town of Guadalupe, separating the Valley of Mexico into a northern and southern portion. These, the so-called Sierra de Guadalupe, are connected with the western mountain chain Monte bajo, by the low ridge Cuesta de Barrientos, and with the north-eastern ridges by the Cerro de Chiconautla. The northern half of the valley thus formed is occupied by Lakes Zumpango, Xaltocan and San Cristobal, the southern half by the three lakes best known to travellers, Texcoco, Chalco and Xochimilcho.

A few words are necessary as to the geography, topography and geology of the region visited botanically. Cerro de Tepeyac, one of the hills of the aforementioned Sierra de Guadalupe, is 140 ft. high; very few plants are found on this hill. If one ascends the east side, he finds for the first 115 ft. a fine crystalline rock of a dark violet-gray color of a close texture frequently spotted with green, scaly, porous particles. The summit of the hill is covered with a pitchstone-like rock formation about 16 to 26 ft. thick. By a rocky bridge, Cerro de Tepeyac is connected with the Cerro Gachupines. Felix and Lenk² say of this hill: "An dessen Abhang passirt man zunächst zwei, 5 bezw. 8 m. mächtige Pechsteinzonen, zwischen und über welchen der röthlichgraue, körnige Andesit sich ausbreitet, der die Hauptmasse des Berges ausmacht und in einigen Steinbrüchen zu industriellen Zwecken abgebaut wird."

The pedregal of Tlalpam, or of San Angel is one of the most interesting formations in the valley, covering an area of about 7,000 acres. The pedregal is an extinct lava stream situated between the towns of San Angel and Tlalpam, and extending southward up the sides of the Sierra del Ajusco to the hill called Chitle. It was formed when the southern mountains were in active volcanic eruption. The eye of the traveller sweeps unobstructedly over an arid black landscape, which might be compared to the sudden stiffening of the rolling surface of the sea. The country is extremely uneven and rugged; the coulee of lava is full of cracks, blisters,

² 1890. Felix and Lenk, Beiträge zur Geologie und Paläontologie der Republik Mexico, I, 70.

caverns and sinks produced during the process of cooling. It is raised into cones, presents most curious sinuosities, and is here and there broken down into rugged jagged protuberances, as sharp and cutting as a knife's edge. This interesting coulee is from 33 to 50 ft. thick over its greatest extent, and from 20 to 26 ft. thick along its borders. Felix and Lenk³ give a very interesting and true description of this lava bed. "Wogenberg erhebt sich neben Wogenthal; hier ist die Lava glatt und mit einer glänzenden Erstarrungskruste überzogen, dort ist sie, wie der Gischt der Welle, schaumig und schlackig. Deutlich kann man beobachten, wie die erstarrte Oberfläche häufig geborsten ist und auf den weitreichenden Rissen dünn flüssigere Lavamassen emporgequollen sind, die von den klaffenden Spaltenrändern mächtige Blöcke mitgerissen und nach kurzem Transport zu chaotischen Trümmerhaufen aufgestaut haben.— Ausser kleinen, einst durch die Gasentwicklung in der Lavamasse entstandenen Hohlräumen, welche schliesslich zur Kleinheit der Dampfpori herabsinken, finden sich stellenweise in ihr auch geräumige mehrere cubikmeter haltende Grotten, welche genetisch wohl als sogenannten 'Schlackensäcke' zu betrachten sind. Durch späteren der Einsturz Decken oder durch die bei Abkühlung in Folge der eintretenden Contraction aufgerissenen Spalten sind sie zum Theil geöffnet und bieten zahlreichen Fledermäusen Wohnung, dem Reisenden bei einbrechendem Unwetter schützendes Obdach." The lava of the Tlalpam pedregal is a typical hypersthene free basalt.

But that which concerns us most are the plants, which together form a very rich and remarkable flora. Among the causes which favored the development of this peculiar flora may be mentioned the soil temperature, which is warm and uniform, owing to the soil being a basaltic scoria in the protection of which a large number of herbaceous plants flourish; the direction of the wind, the humidity of the atmosphere of this region also favor a rich plant growth. The pedregal is surrounded by high hills, protected thus from the tempestuous winds of the north. Woods of pine, oak and fir clothe the hillsides and serve as an additional protection. In this region are found deep cañadas, always damp and wet from abundant water, which comes from numerous showers and the spray of waterfalls which precipitate themselves from various heights. As a result of these factors, the climate of the pedregal is more temper-

³ 1890. Felix and Lenk, l. c., 79.

ate and more constant than that of the City of Mexico, or of the Hacienda de Eslava, where a meteorological station has been established. In consequence of the meteorological conditions, the pedregal supports a flora made up of many representatives of the tierra fria, tierra templada and tierra caliente.

The Serrania de las Cruces is a continuation northwestward of the Sierra del Ajusco. It is an elevated region, and by reason of that elevation and exposure to the winds of the north and west presents a very distinct flora. One part of the region, that on the west flanks of the Serrania del Ajusco, is very humid; the central portion is more dry. Large forests of fir, *Abies religiosa*, once covered the western side, but these are fast disappearing before the axe of Mexican wood choppers. The higher elevations present a characteristic alpine flora. Many of the places with an eastern exposure are quite sterile, as to the abundance of plants found in such localities.

CATALOGUE OF SPECIES FROM THE VALLEY OF MEXICO.⁴

A. Lots. City of Mexico.

FICOIDEÆ.

1. *Sesuvium portulacastrum* Linn. Syst. ed X, 1,058; Jacq. Amer., t. 95, Biol. Centr. Amer., I, 556.

North Mexico, South Mexico, Nicaragua. Common on the seashores within the tropics. "Verdolaga de Costa," (Cuba). Aug. 12 (1).

ONAGRACEÆ.

2. *Oenothera rosea* [Soland in] Ait. Hort. Kew. ed. I, ii, 3; DC. Prodr., III, 51; Biol. Centr. Amer. Bot., I, 454.

Widely distributed through Mexico, extending into Texas; also in Colombia and some of the West Indian Islands. Naturalized in tropical Africa, India and the Canary Islands. Aug. 12 (3).

COMPOSITÆ.

3. *Aster Potosinus* A. Gray in Proc. Amer. Acad., XV, (1880), 32; Biol. Centr. Amer. Bot., II, 122.

North Mexico, mountains of San Luis Potosi, 6,000 to 8,000 feet (Parry & Palmer, 384). Aug. 12 (4).

⁴The natural orders are arranged according to the Engler and Prantl system. The species are according to the Index Kewensis with the aid of HEMSLEY'S *Biologia Centrali Americana* (Botany). See for a description of the ecological plant regions of the Valley of Mexico an article by the writer: "A Botanical Excursion to Mexico." Amer. Journ. Pharm., 68, p. 588, and the translation *Una Excursion botánica á México*, El Tiempo Diario Catolico, Dec. 4, 1896.

4. *Erigeron scaposus* DC., Prodr., V, 287.
Aster rivularis Lees in Linnæa, V, 143, excl. synonym.

Widely distributed in Mexico. Aug. 12 (2).

B. *Tlalpam Valley of Mexico.*

SALICACEÆ.

5. *Salix Bonplandiana* H. B. K., Nov. gen. et Sp., II, 24, tt. 101, 102; DC., Prodr. XVI, 2, p. 200.

A tree found in several recorded districts in South Mexico. Along roads leading from Tlalpam to Lake Xochimilcho, "Sauce" (Mexico). Aug. 15 (86).

NYCTAGINACEÆ.

6. *Mirabilis Jalapa* Linn., Sp. Pl., 177; Choisy in DC. Prodr., XIII, 2, p. 427; Lam. Ill., Pl., t. 105; Bot. Mag., t. 371.

Roadsides near Tlalpam. Abundant in other parts of Mexico.

"Maravilla" (Cuba); "Marvel of Peru"; "Four o'clock"; "False Jalap." Aug. 15 (81).

CARYOPHYLLACEÆ.

7. *Arenaria lanuginosa* Rohrb. in Mart. Fl. Bras., XIV, ii, 274; Biol. Centr. Amer. Bot., I, 69.

Arenaria alsinoides Willd. in Ges. Naturf. Fr. Berl. Mag., VII, (1813) 201.

Common from North Carolina to Mexico, southward to Peru and Bolivia. Tlalpam, Aug. 22 (215).

ILLECEBRACEÆ.

8. *Corrigiola Andina* Planch & Triana in Ann. Sc. Nat. Sér., IV, XVII (1862) 146; Biol. Centr. Amer. Bot., III, 11.

Found in North and South Mexico and Colombia; Tlalpam, Aug. 22 (220).

RANUNCULACEÆ.

9. *Ranunculus orthorhynchus* Hook., Fl. Bor. Am., I, 21, t. 9; Biol. Centr. Amer. Bot., I, 7.

Ranunculus dichotomus Moç et Sessé in DC. Syst. Veg. I, 288.

A widely distributed plant in Mexico. Ditches near Lake Xochimilcho, Aug. 15 (80).

PAPAVERACEÆ.

10. *Argemone Mexicana* Linn., Sp. Pl., 508; Lam. Ill., t. 452; Materia Medica Mexicana, 153 (plate).

This is now a common weed in most tropical and sub-tropical countries, flowering from April to October, and abundant in culti-

vated fields. Introduced with ballast into Philadelphia. It is used by the bush doctors of the Bahamas according to Dolley⁵ for the small-pox. "Its seeds have been used elsewhere as a substitute for Ipecacuanha, its juice is said to destroy warts, to be efficacious against the bites of venomous serpents, and to be useful in ophthalmia."

"El Chicalate"; "Argemone du Mexique"; "Adormidera espinosa," Chicalotl (Mexico); "Cardo Santo" (Antilles, Cuba); "Prickly-poppy"; "Mexican Poppy," "Yellow-thistle," "Fin Bush." Roadsides near Tlalpam, Aug. 15 (82).

CRUCIFERÆ.

11. *Raphanus Raphanistrum* Linn., Sp. Pl., 669.

This plant is naturalized in Mexico, and occurs in the collections of many travellers. "Wild Radish." Aug. 20 (185).

12. *Sisymbrium canescens* Nutt., Gen. Am., II, 68.

In North America from Arctic Circle to South Mexico. Tlalpam, Aug. 22 (221).

RESEDACEÆ.

13. *Reseda Luteola* Linn. Sp. Pl., 449; Biol. Centr. Amer. Bot., I, 46.

Without doubt an introduced plant. Tlalpam, Aug. 20 (186).

LEGUMINOSÆ.

14. *Phaseolus* sp.

Near Tlalpam, Aug. 15 (103).

15. *Trifolium amabile* H. B. K. Nov. gen. et sp., VI, 503, t. 593; Biol. Centr. Amer. Bot., I, 232.

Abundant throughout Mexico. The several specimens collected in 1896 are questionably referred to this species. Tlalpam, Aug. 20 (155).

GERANIACEÆ.

16. *Oxalis divergens* Benth. Pl. Hartw., 9; Bot. Reg., t. 1,620; Biol. Centr. Amer. Bot., I, 163.

Collected by various botanists in several parts of Mexico along ditches. Tlalpam, Aug. 20 (178).

17. *Erodium cicutarium* L'Herit ex Ait. Hort. Kew. ed. I, ii, 414; Leman in DC. Fl. Fr., IV, 840; Biol. Centr. Amer. Bot., I, 161.

Widely dispersed in the north temperate regions of the Old World, and now exceedingly common in many parts of North Amer-

⁵ Dolley, Prov. List Plants of Bahama Islands

ica, but supposed to have been originally introduced by the Spaniards. Collected by botanists in several places. Tlalpam fields, Aug. 20 (183).

ANACARDIACEÆ.

18. *Schinus molle* Linn. Sp. Pl., 388; Lam. Ill., t. 822; Biol. Cent. Am. Bot., I, 221.

Dispersed from country to country by the birds tzenzontles and xilgueros, which eat the fruit and void the seeds. Found in Tropical America to South Brazil, occurring in the Andes at 12,000 to 13,000 feet. Supposed to have been introduced by the early Spaniards in order to procure wood in the volcanic district (Christy). Will bear droughts and the intense summer heat of Central Australia better than almost any introduced plant (Von Mueller). The plant, which flowers from March to May in Mexico, occurs in the Valley on the pedregal in saline soils, fertile soils and along the margins of Lake Texcoco. "El Arbol de Peru"; "Pelonquahuitl"; "Copalquahuitl"; "Molle"; "Pimienta de America." Roadsides near Tlalpam, Aug. 15 (84).

MALVACEÆ.

19. *Sphaeralcea angustifolia* G. Don. Gen. Syst., I, 465; Biol. Centr. Amer. Bot., I, 113.

Malva angustifolia Cav. Diss., I, 64, t. 20; Bot. Mag., t. 2, 839.

Sphaeroma angustifolium Schl. in Linnæa, XI, 353.

Widely distributed in Mexico according to the collections of botanists. Tlalpam, Aug. 20 (181).

LYTHRACEÆ.

20. *Cuphea* sp.

Near ditches. Tlalpam, Aug. 15 (85).

21. *Lythrum alatum* Pursh. Fl. Am. Sept., I, 334; Biol. Cent. Am. Bot., I, 447.

From Canada southward, chiefly in the eastern and southern States to South Mexico. Roadsides near Tlalpam, Aug. 15 (87).

ONAGRACEÆ.

22. *Oenothera rosea* [Soland. in] Ait. Hort. Kew., ed. I, ii, 3.

(Repeated). Tlalpam, Aug. 20 (172).

PRIMULACEÆ.

23. *Anagallis arvensis* Linn. Sp. Pl., 148; Biol. Centr. Amer. Bot., II, 289.

A widely dispersed Old World plant naturalized, and common in some parts of Mexico (Hemsley). Tlalpam, Aug. 22 (no number).

POLEMONIACEÆ.

24. *Cobæa scandens* Cav. Ic., I, 11, t. 16, 17; Biol. Centr. Amer. Bot., II, 358; Bot. Mag., t. 851; Flore des Serres, t. 1,467.

Walls of gardens. Tlalpam, Aug. 20 (148).

LABIATÆ.

25. *Salvia Mexicana* Linn. Sp. Pl., 25; DC. Prodr., XII, 337; Biol. Centr. Amer. Bot., II, 361; Cav. Ic., I, p. 16. t. 26.

Reported from a number of localities in North and South Mexico. Tlalpam, Aug. 22 (222).

26. *Salvia amarissima* Orteg. Hort. Matr., Dec. 4; DC. Prodr., XII, 317; Bot. Reg., t. 347; Biol. Centr. Amer. Bot., II, 553.

Reported from several localities in Mexico. The specimens collected in 1896 are doubtfully referred to this species, differing in several respects, notably the rough hairs and long petioles from the plant so named in the herbarium of the Academy of Natural Sciences. It may be a variety, which I here propose, as variety *petiolaris* n. var. Tlalpam, Aug. 22 (223).

SOLANACEÆ.

27. *Solanum Cervantesii* Lag. Gen. et Sp., Nov. 10; Biol. Cent. Am. Bot., II, 406.

North and South Mexico. Roadsides near Tlalpam, Aug. 15 (83).

28. *Solanum nigrum* L., var. *villosum* Mill. *S. nigrum* Linn. Sp. Pl., 186; Biol. Centr. Amer. Bot., II, 412.

This species is a common weed in nearly all tropical and temperate countries, but it is impossible to determine where it is really indigenous (Hemsley). Tlalpam (154).

29. *Solanum cornutum* Lam. Illustr., II, 25; DC. Prodr., XIII, i, 328; Jacq. Eclog., t. 104; Biol. Centr. Amer. Bot., II, 407.

North and South Mexico. Tlalpam, Aug. 20 (180). Asa Gray distinguishes *S. cornutum* by its simple, non-stellate hairs, otherwise it is much like *S. rostratum* from Colorado.

30. *Nicotiana glauca* R. Grah. in Edinb. N. Phil. Journ. (Apr.-June, 1828) 175; Bot. Mag., t. 2,837; DC. Prodr., XIII, i, 562; Biol. Centr. Amer. Bot., II, 434.

"This quickly growing arborescent species can be raised on mere sand on the coast, as one of the best plants to establish shelter and stay the shifting of the sand waves. There the poisonous quality of its foliage is not objectionable. It is inadmissible to pastural places on account of its deleteriousness" (Von Mueller). North and

South Mexico, Valley of Mexico. Roadsides near Tlalpam and growing on walls and roofs of adobe houses.

PLANTAGINACEÆ.

31. *Plantago hirtella* H. B. K. Nov. Gen. et Sp., II, 229, t. 127; A. Gray, Synop. Fl. N. Am., II, 392; Biol. Centr. Amer. Bot., II, 575.

California, Mexico, Chili. Tlalpam, Aug. 20 (153).

COMPOSITÆ.

32. *Eupatorium* sp.

Tlalpam, Valley of Mexico, Aug. 20 (179).

33. *Heterotheca Lamarekii* Cass. in Dict. Sc. Nat., XXI, 130; DC. Prodr., V, 317; S. Wats., Proc. Am. Acad., XVIII, 102; Biol. Centr. Amer. Bot., IV, 52.

South Carolina, westward and southward, North Mexico, Monterey, Nuevo Leon. Tlalpam, Aug. 20 (182).

34. *Heterospermum pinnatum* Cav. Ic., III, 34, t. 267; Willd., Sp. Pl., III, 2, 129; Biol. Centr. Amer. Bot., II, 195.

North and South Mexico, collected by a number of botanists. Tlalpam, Aug. 20 (219).

35. *Schkuhria virgata* DC. Prodr., V, 654; Biol. Centr. Amer. Bot., II, 212.

North Mexico, region of San Luis Potosi, 6,000 to 8,000 feet (Parry & Palmer); South Mexico, Guanajuato (Mendez); near Tacubaya (Schaffner); Chapultepec (Bilimek); Guatemala. Tlalpam, Aug. 22 (214).

C. Lake Xochimilcho, Valley of Mexico.

MARSILIACEÆ.

36. *Marsilia heterophylla*?

Ditches near Xochimilcho, Aug. 15 (78).

ALISMACEÆ.

37. *Sagittaria sagittifolia* Linn. var. *Mexicana*, Mart. et Gal.

S. sagittifolia Linn., Sp. Pl., 993; Biol. Centr. Amer. Bot., III, 439; var. *Mexicana* Mart. et Gal. in Bull. Acad. Brux., IX, 8; Micheli in DC. Monogr. Phanerog., III, 66.

Lake Xochimilcho on wet chinampas, Aug. 15 (92).

CYPERACEÆ.

38. *Cyperus unioides* R. Br. Prodr. Fl. N. Hall., 216; Clarke in Journ. Linn. Soc., XXI, 61.

Cyperus bromoides Willd. ex Link, III, 85; Kunth, Enum. Pl. II, 8.

Found in South Mexico, Guatemala, Venezuela and Paraguay. Other varieties of this species are found in India, Australia and South Africa. Lake Xochimilcho on chinampas, Aug. 15 (93).

ERIOCAULONEÆ.

39. *Eriocaulon Benthami* Kunth Enum., Pl. III, 545; Biol. Centr. Amer. Bot., III, 443; Koern in Mart. Fl. Bras., III, 490.

Recorded from South Mexico and Guatemala. Lake Xochimilcho on chinampas, Aug. 15 (97).

PONTEDERiaceÆ.

40. *Eichornia azurea* Kunth Enum., Pl. IV, 129; Solms in DC. Monogr. Phanerog., IV, 528; Abhandl. Naturf. Gesell., Halle, VI, 177, cum icon.; Bot. Mag., t. 6, 487.
Pontederia azurea Swartz, Fl. Ind. occ., I, 609.

Common over Tropical and Extra-tropical South America and the West Indies. Closely similar to the water hyacinth *Piaropus* (*Pontederia*, *Eichornia*) *speciosa* Kunth, a native of South America. Whether this plant is indigenous to the canals and lakes of the Valley of Mexico is a question; at any rate it is very abundant in many of the ditches in the City of Mexico, and is also found abundantly floating about in Lake Xochimilcho. The related Water Hyacinth is extremely troublesome to navigation in the rivers of Florida.⁶

Lake Xochimilcho, Aug. 15 (88).

POLYGONACEÆ.

41. *Polygonum amphibium* Linn., Sp. Pl., 361; DC. Prodr., XIV, 115; A. Gr., Man. Bot. ed. 5, 416; Fl. Dan., t. 282.

A very widely dispersed species in the temperate and subtropical regions of the N. Hemisphere. Lake Xochimilcho on the edge of the chinampas, Aug. 15 (91).

NYMPHAEACEÆ.

42. *Nymphaea Mexicana* Zucc. in Abh. Akad. Muench., I, (1832), 365; Flora (1832) II; Beibl, 75; Biol. Centr. Amer. Bot., I, 26.

The flowers of this plant are straw-yellow. Lake Xochimilcho, Aug. 15 (100).

43. *Nymphaea tussilagifolia* Lehm., Ind. Sem. Hort. Hamb. (1853), 10; Ann. Sc. Nat., ser. 4, Vol. I, 326.

Collected by Lehman in Lake Chalco near Yotla, also found in the Amazon. The flowers of this handsome water lily are white. Lake Xochimilcho, Aug. 15 (101).

⁶ See the Water Hyacinth and its Relation to Navigation in Florida, Bull. 18, Div. of Bot. U. S. Dept. Agric., H. J. Webber.

RANUNCULACEÆ.

44. *Ranunculus Cymbalaria* Pursh. Fl. Am. Sept., II, 392; DC. Syst. I, 252; Biol. Centr. Amer. Bot., I, 16.

Distributed from Canada to the Argentine Republic, also in Northern Asia and Europe. Ditches near Lake Xochimilcho, Aug. 15 (79).

SCROPHULARIACEÆ.

45. *Escobedeia (linearis) laevis* Cham & Schlecht in Linnæa, V, (1830), 108; DC. Prodr., X, p. 337; Biol. Centr. Amer. Bot., II, 456, also plate.

Recorded from a number of localities in South Mexico. Lake Xochimilcho on the chinampas. Flowers white. Aug. 15 (90).

LOBELIACEÆ.

46. *Lobelia fulgens* Willd. Hort. Berol., t. 85; DC. Prodr., VII, 382; Biol. Centr. Amer. Bot., II, 267.

Lobelia splendens Willd., Hort. Berol., t. 86; A. Gr., Synop. Fl. N. Am. II, 3; Bot. Mag., t. 4,960 (var. ignea).

From Texas to Panama throughout Mexico. Lake Xochimilcho on chinampas, Aug. 15 (89).

COMPOSITÆ.

47. *Solidago paniculata* DC. Prodr., V, 340; Biol. Centr. Amer. Bot., II, 116.

S. Mexicana H. B. K., Nov. Gen. et. Sp., IV, 104?

Lake Xochimilcho on chinampas, Aug. 15 (95).

48. *Cnicus linearifolius* Watson.

Lake Xochimilcho on chinampas, Aug. 15 (99).

49. *Bidens chrysanthemoides* Michx. Fl. Bor. Am., II, 136; Torr. & Gr., Fl. N. Am., II, 352; Biol. Centr. Amer. Bot., II, 201.

Common from Canada throughout the United States east of the Rocky Mountains and in Arizona, California and North Mexico. Lake Xochimilcho on chinampas, Aug. 15 (102).

D. *Cerro de Guadalupe, Valley of Mexico.*

LILIACEÆ.

50. *Milla biflora* Cav. Ic., II, 76, t. 196; S. Watson, Proc. Am. Acad., XIV, 240, et XVIII, 165; Bot. Reg., t. 1,555.

Found in New Mexico, South Arizona, North and South Mexico. Cerro de Guadalupe growing on exposed rocky faces of the hill in small soil pockets, Aug. 18 (108).

PORTULACACEÆ.

51. *Talinum aurantiacum* Engelm. in Bost. Jour. Nat. Hist., VI, (1850), 153; Biol. Centr. Amer. Bot., I, 78.

Texas and New Mexico to North and South Mexico in sandy places. Cerro de Guadalupe on rock faces,⁷ Aug. 18 (106).

52. *Talinum patens* Willd. Sp. Pl., II, 863; Biol. Centr. Amer. Bot., I, 79.

North and South Mexico, also in South America, West Indies and some of the Pacific Islands. Cerro de Guadalupe on rock faces, Aug. 18 (109).

GERANIACEÆ.

53. *Oxalis decaphylla* H. B. & K. Gen. et Sp., V, 238, t. 468; Biol. Centr. Amer. Bot., I, 163.

Texas to North Mexico to South Mexico. This oxalid shows great sensivity to light, in that its leaves assume the hot sun position in the same manner in which they show nyctitropic, or sleep movements. Each of the ten leaflets arranged at the end of the common petiole in a circular manner, first fold the two halves on each side of the midrib back to back, and then they all fold down together like the closing of an umbrella. Cerro de Guadalupe, Aug. 18 (107).

CACTACEÆ.

54. *Mammillaria strobiliformis* Scheer ex Salm. Dyck. Cact. Hort. Dyck., ed. II, 104; Biol. Centr. Amer. Bot., I, 524.

Collected by Potts in Chihuahua. I refer the plant collected by me doubtfully to this species. Cerro de Guadalupe, Aug. 18.

BIGNONIACEÆ.

55. *Tecoma mollis* H. B. K. Nov. Gen. et. Sp., III, 144; DC. Prodr., IX, 224; Biol. Centr. Amer. Bot., II, 496.

North and South Mexico. Cerro de Guadalupe, Aug. 18.

E. *Pedregal near Tlalpam. Valley of Mexico.*

6. *Selaginella lepidophylla* Sering. Monogr. Lycopod. II, 72; Biol. Centr. Amer. Bot., III, 707.

Texas through Mexico, southward to Peru. One of the so-called resurrection plants. In normal grown condition, the leaves and

⁷ See An Ecological Study of the Genus *Talinum* with Descriptions of Two Species, Bull. Torrey Botan. Club, XXIV, p. 182, Apr., 1897, J. W. Harshberger.

branches are outspread, and the plant becomes mortar-shaped ; when dry it rolls up and may preserve this form for years. If again wetted it unrolls.

Abundant on faces and sides of the lava. Pedregal near Tlalpam, Aug. 20 (190).

FILICES.

57. *Polypodium* sp.

Pedregal near Tlalpam, Aug. 20 (164).

58. *Notholaena ferruginea* Desv. Hook, Sp. Fil. V, 108 ; Eaton Ferns N. Am., I, 297 t. 39, figs. 7-10 ; Biol. Centr. Amer. Bot., III, 673.

Texas, New Mexico, Arizona, North and South Mexico, West Indies and Colombia to Chili.

Bare faces of rocks, pedregal, Aug. 22 (208).

59. *Cheilanthes myriophylla* Desv. Hook, Sp. Fil., II, 100, t. 105 A ; Biol. Centr. Amer., III, 616.

North and South Mexico reported from several localities and the pedregal by Bourgeau ; in Peru and Chili.

Bare rocks, pedregal, Aug. 22 (207).

GRAMINEÆ.

60. *Bouteloua prostrata* Lag. in Varied. Cienc., ii, IV (1805) 141 ; Gen. et. Sp. Nov. 5th ; S. Wats. in Proc. Am. Acad., XVIII, 176 ; Biol. Cent. Am. Bot., III, 562.

"This annual grass is widely distributed from Mexico to Colorado, prevailing in bottom land, where it frequently mats the ground but does not seem to be relished by cattle" (Vasey).

North and South Mexico, Colombia and Ecuador. Pedregal, Aug. 20 (156).

61. *Microchloa setacea* R. Brown, Prodr., I, 208 ; S. Wats., Proc. Amer. Acad., XVIII, 176 ; Biol. Centr. Amer. Bot., III, 557.

Reported from North Mexico southward to Bolivia and Brazil. Also in North Australia, tropical Africa and Asia.

Hills near Tlalpam, pedregal, Aug. 22 (204).

CYPERACEÆ.

62. *Cyperus seslerioides* H. B. K. Nov. Gen. et Sp. I, 209 ; Biol. Centr. Amer. Bot., III, 451.

Reported in North and South Mexico, also on the Orinoco.

Pedregal, Aug. 22 (196).

COMMELINACEÆ.

63. *Commelina scabra* Benth. Pl. Hartw., 26 ; C. B. Clarke in DC. Monogr. Phanerog., III, 153 Biol. Centr. Amer. Bot., III, 389.

South Mexico in several places. Pedregal, Aug. 22 (218).

LILIACEÆ.

64. *Milla biflora* Cav. Ic., II, 76 t. 196.

Pedregal, Aug. 20 (repeated).

65. *Calochortus flavus* Schult. f. Syst., VII, 1535; Biol. Cent. Am. Bot., III, 380.

Reported in both North and South Mexico. The flowers have large nectar glands on the petals guarded by hairs.

Pedregal, Aug. 20 (161).

ORCHIDACEÆ.

66. *Habenaria filifera* Wats.

Collected by Mexican botanists on Sierra de Ajusco at Eslava, 8,000 feet. Pedregal, Aug. 22.

CUPULIFERÆ.

67. *Quercus undulata* Torr. var. *grisea* Engelm. *Q. undulata* in Ann. Lye. N. York, II, (1828) 248, t. 4.

A low-growing, scrubby tree, used for fire-wood. Pedregal, Aug. 22 (195).

PORTULACACEÆ.

68. *Talinum napiforme* DC. (Char. amplif.) Hemsley, Diag. Pl. Nov. pars altera., 23; DC. Prodr., III, 357; Biol. Centr. Amer. Bot., I, 79; Bull. Torrey Bot. Club, XXIV, 183, t. 299.

Described from drawing made by DC. of the species. Pedregal, Aug. 20 (166).

CARYOPHYLLACEÆ.

69. *Drymaria gracilis* Cham. & Schlecht. in Linnaea, V (1830) 232; Biol. Centr. Amer. Bot., I, 73.

South Mexico. Pedregal, Aug. 22 (199).

RANUNCULACEÆ.

70. *Clematis dioica* Linn. Syst. ed. X, 1084; Sloane, Hist. Jam., I, 199, t. 128, fig. 1; Biol. Centr. Amer. Bot., I, 2.

Recorded in several places in South Mexico, also found in Brazil, Colombia and West Indies, "Cabello de Angel" (Cuba).

Pedregal, Aug. 20 (162).

LEGUMINOSÆ.

71. *Phaseolus* sp.

Pedregal near Tlalpam, Aug. 20th (187).

72. *Zornia diphylla* Pers. Syn., II, 318; Benth in Mart. Fl. Bras., XV, 80 tt., 21, 22; Biol. Centr. Amer. Bot., I, 273.

A very variable plant, common in most tropical and subtropical regions throughout the world, and occurring in nearly all collections

from Panama, Costa Rica, Nicaragua, Guatemala and Mexico. The two leaflets usually assume the hot sun position standing up vertically back to back. When the plant is in flower, these serve to enclose the blossom.

Pedregal on exposed lava in rosettes, Aug. 20 (167).

73. *Eysenhardtia amorphoides* H. B. & K. Nov. Gen. et Sp., VI, 489 t. 592.

From New Mexico, Texas, through North to South Mexico. "Palo dulce blanco;" "Coatle." Used as a succedaneum for sandal-wood. Pedregal, Aug. 22 (197).

74. *Crotalaria pumila* Orteg. Hort. Matr., 23; Biol. Centr. Amer. Bot., I, 228.

From New Mexico to South Mexico. Pedregal, Aug. 22 (217).

75. *Phaseolus* sp.

Pedregal, Aug. 22 (212).

EUPHORBIACEÆ.

76. *Acalypha phleoides* Cav. in Anal. Hist. Nat. Madr., II (1800) 139; Biol. Centr. Amer. Bot., III, 127.

Abundant in two varieties through Mexico. The plant collected in 1896 in the Valley of Mexico is doubtfully referred to this species. Pedregal, Aug. 22 (203).

77. *Euphorbia adenoptera* Bertol. Misc. Bot., III, 20, t. 23; DC. Prodr., XV, 2, 49.

Distributed from Florida, Texas, New Mexico to South Mexico, West Indies and South America. Doubtfully referred by me to this species. Pedregal, Aug. 22 (202).

SAPINDACEÆ.

78. *Cardiospermum Halicacabum* Linn. Sp. Pl. 366; Biol. Cent. Am. Bot., I, 209.

A very common plant in tropical and subtropical regions of both hemispheres. It was difficult for me to distinguish my plant from *C. molle*, which it closely resembles. North and South Mexico. Pedregal, Aug. 20, climbing over other plants (159).

MALVACEÆ.

79. *Malvastrum Peruvianum* A. Gray. Bot. U. S. Explor. Exped., I, 146; Biol. Centr. Amer. Bot., I, 99.

Pedregal, Aug. 22 (224).

CACTACEÆ.

80. *Cereus serpentinus* DC. Prodr. III, 467; Biol. Centr. Amer. Bot., 546; Bot. Mag., t. 35, 66.

South Mexico, used occasionally for forming hedges. Pedregal, Aug. 22.

UMBELLIFERÆ.

81. *Eryngium comosum* Delar. Eryng. 30, t. 7; Biol. Centr. Amer. Bot. I, 560.

Recorded from a number of stations in South Mexico. Pedregal, Aug. 22 (211).

ASCLEPIADACEÆ.

82. *Asclepias neglecta* Hemsley. Biol. Centr. Amer. Bot., II, 325.

Recorded from South Mexico by a number of botanists. The specimens collected in 1896 doubtfully referred to this species. Hills above Tlalpam portion of pedregal, Aug. 22 (194).

83. *Asclepias Linaria* Cav. Ic., I, 42, t. 57; Biol. Centr. Amer. Bot., II, 324; DC. Prodr., VIII, 570.

North and South Mexico. Pedregal, Aug. 20 (165).

84. *Philibertia elegans* Hemsl. Biol. Centr. Amer. Bot., II, 318.

Recorded from a number of localities in South Mexico. A climbing or trailing plant. Pedregal, Aug. 20 (188).

PLUMBAGINACEÆ.

85. *Plumbago pulchella* Boiss. in DC. Prodr., XII, 692; Biol. Cent. Am. Bot., II, 287.

From North to South Mexico. Used by the Mexican Indians to raise blisters, cure toothache and the running of the eyes (*Materia Medica Mexicana*, p. 79, fig.) "El Pañete"; "Jiricua"; "Tlepatli"; "Yerba del alacrán"; "Cola depescado"; "Cola de iguana"; "Yerba lumbre." Pedregal, Aug. 22 (213).

CONVOLVULACEÆ.

86. *Ipomoea longipedunculata* Hemsl. Biol. Centr. Amer. Bot., II, 339.

Pedregal, Aug. 20 (175).

VERBENACEÆ.

87. *Priva tuberosa* S. Wats. in Proc. Amer. Acad., XVIII (1883) 135.

Pedregal near Tlalpam, Aug. 22 (198).

LABIATÆ.

88. *Mentha rotundifolia* Huds. Fl. Angl. ed. I, 221; Biol. Cent. Am. Bot., II, 546.

Naturalized in some parts of Mexico. Found also in Europe, Asia, and Northern Africa. Pedregal, Aug. 22 (221a).

SOLANACEÆ.

89. *Nectouxia formosa* H. B. & K. Nov. Gen. et Sp., III, 10, t. 193; Biol. Centr. Amer. Bot., II, 425.

This herbaceous monotype has been collected in a number of places in Mexico. The fruit is eaten. Pedregal, Aug. 20.

90. *Solanum bulbocastanum* Dun. in Poir Encyc. Suppl., III, 749; Biol. Centr. Amer. Bot., II, 405.

Pedregal, Aug. 22 (209).

SCROPHULARIACEÆ.

91. *Pediularis Mexicana* Zucc. ex Bunge in Bull. Phys. Math. Acad. Petersb., I, (1843) 384; Biol. Centr. Amer. Bot., II, 467.

Pedregal, Aug. 20 (184).

92. *Lamourouxia rhinanthifolia* H. B. & K. Nov. Gen. et Sp., II, 337, t. 169; Biol. Centr. Amer. Bot., II, 466.

Collected in quite a number of places through Mexico. Pedregal, Aug. 22 (193).

ACANTHACEÆ.

93. *Calophanes decumbens* A. Gr. Syn. Fl. N. Am., II, i, 325; Biol. Centr. Amer. Bot. II, 502.

From Texas, Arizona to the Valley of Mexico. Pedregal, Aug. 22 (200).

94. *Ruellia* sp.

On hills above pedregal near Tlalpam, Aug. 22 (205).

COMPOSITÆ.

95. *Tagetes lucifer* Cav. Ic., III, 33, t. 264; Biol. Centr. Amer. Bot., II, 222; DC. Prodr. V, 643; Bot. Mag., t. 740.

Extending from Texas through North to South Mexico. Collected by Bourgeau in pedregal. "Pericon." pedregal, Aug. 20 (192).

96. *Dahlia coccinea* Cav. Ic., III, 33, t. 266; Bot. Mag., t. 762; Biol. Centr. Amer. Bot., II, 196.

Collected by Bourgeau in the Valley of Mexico. This plant has a northerly and extensive distribution. "From the Cordilleras of Chihuahua, within 200 miles of the United States boundary, it ranges southward through the mountains to Jalisco and the Valley of Mexico. It shows a remarkable variation in color from cardinal of several shades, through scarlet, scarlet-orange, mandarin, orange, lemon-yellow, yellow. The so-called scarlet-orange rays are scarlet with lines of yellow running through, so that the strap-shaped corolla has a somewhat banded appearance. The ligulate corolla is about an inch long and half an inch broad. The entire head varies in size from two inches in the cardinal ones to three inches in the scarlet-orange." (See my article "The Native Dahlias of Mexico," Science n. s. VI, 909, Dec. 17, 1897).

Pedregal near Tlalpam, Aug. 20 (160).

97. *Zinnia pauciflora* Linn. Sp. Pl. ed. II, 1,269; Lam. Ill., t. 685, f. 1; Biol. Centr. Amer. Bot., II, 154; Amer. Acad. Arts & Sci., XXXII, 19.

Mexico, Andes of Peru, Bolivia, St. Thomas, W. I., and introduced into W. Africa and Cape Verde Islands. Pedregal, Aug. 20 (157).

98. *Zexmenia aurea* Benth & Hook, f. Gen., II, 371, in nota sub *Wedelia*; Biol. Centr. Amer. Bot., II, 172.

Pedregal, Aug. 22 (191).

99. *Tagetes micrantha* Cav. Ic., IV, 31, t. 352; DC. Prodr., V, 646; Biol. Centr. Amer. Bot., II, 222.

Recorded by a number of botanists from Arizona and Texas southward to Costa Rica. Pedregal, Aug. 22 (201).

100. *Pectis prostrata* Cav. Ic., IV, 12, t. 324; DC., Prodr., V, 100; Biol. Centr. Amer. Bot., II, 226.

Collected in Florida, New Mexico, Mexico, Colombia and the West Indies (Cuba). "Romero macho" (Cuba); Pedregal, Aug. 22 (210).

101. *Stevia Eupatoria* Willd. Sp. Pl., III, 1,775; Bot. Mag., t. 1,849; Biol. Centr. Amer. Bot., II, 86.

The specimens resemble *Stevia linoides* Schult. Bip., although the inflorescence is flatter and more compact. The plant is, therefore, doubtfully referred to the above named species; North and South Mexico. Pedregal, Aug. 22 (206).

- 101b. *Senecio praecox* DC., Prodr., VI, 431.

Senecio praecox is a composite plant inhabiting the volcanic beds in the Valley of Mexico. It has a cylindrical stem rising three or four feet from the ground with clustered, deeply lobed leaves at the top. The plant stores up an abundant supply of water in the pith, which is gradually used up during the dry season in Mexico, which lasts from October to June. The flowers develop in April at the expense of the reserved supply of water. Loss of water during the dry season is prevented by the fall of the leaves, and by the protective cork and balsam secreted in the exo- and endocortex. The water stored in the turgid discs of pith is gradually conducted by the woody cells and tracheids, which penetrate into the medulla by wedge shaped ingrowths, representing the primary bundles, to the growing point where it is used. That this is the case, is shown by the dry parchment-like pith membranes, which were left in a piece of a stem which had remained in the dry state for over sixteen

months. Conduction of water in this stem was accomplished without the aid of root pressure, without any appreciable influence on the part of the small green leaves in drawing up the liquid by the pumping action of transpiration.⁸

Pedregal near Tlalpam, Aug. 22.

F. Pedregal near Tizapan, Valley of Mexico.

Tizapan is a suburban village of the City of Mexico, much higher in elevation above the floor of the valley than Tlalpam, which lies to the northwest of Tlalpam. The pedregal near Tizapan presents the same rugged characters as elsewhere. Along its edge, here, runs the small stream known as Rio Cherubusco. The region shows the same profusion of flowering plants as elsewhere in the pedregal.

FILICES.

102. *Pellaea gracilis*.

Pedregal, 7,500–8000 feet, Aug. 25 (334).

COMMELINACEÆ.

103. *Tradescantia crassifolia* Cav. Ic., I, 54, t. 75; Bot. Mag., t. 1,598; Biol. Centr. Amer. Bot., III, 391.

North and South Mexico, pedregal (Bourgeau). Pedregal, 7,500–8000 feet, Aug. 25 (227).

DIOSCOREACEÆ.

104. *Dioscorea* sp.

Pedregal, 7,500–7,800 feet, Aug. 25 (440).

PORTULACACEÆ.

105. *Calandrinia grandiflora* Lindl. Bot. Reg., t. 1,194.

Pedregal, 7,500–7,800 feet, Aug. 25 (337).

LEGUMINOSÆ.

106. *Eysenhardtia amorphoides* H. B. & K. Nov. Gen. et. Sp., VI, 489.

Pedregal, 7,500–7,800 feet, Aug. 25.

107. *Zornia diphylla* Pers. Syn., II, 318.

Pedregal, 7,500–7,800 feet, Aug. 25.

108. *Cassia* sp.

Pedregal, 7,500–7,800 feet, Aug. 25.

⁸See abstract of paper Water Storage and Conduction in *Senecio praecox* from Mexico, read at Soc. Botanical Physiologists and Morphologists at Cornell University, in Bot. Gaz., Feb., 1898, p. 116, also Science, n. s., vii, p. 120.

109. *Indigofera* sp.

Pedregal, 7,500–7,800 feet, Aug. 25.

SAPINDACEÆ.110. *Dodonæa viscosa* Jacq. Enum. Pl. Carib., 19; Linn. Mant., 228; Biol. Centr. Amer. Bot., I, 215.

Collected by Dr. José Ramirez on the pedregal at Eslava. A plant found in nearly all tropical, sub-tropical and south temperate regions throughout the world, and very common in Central America and Mexico. I doubtfully refer the plant collected to this species. "Chapulistle;" "Limonillo." Pedregal, Aug. 25 (276).

SOLANACEÆ.111. *Solanum nigrum* Linn. Sp. Pl., 186; DC. Prodr., XIII, i, 50; Biol. Centr. Amer. Bot., II, 412.

A common weed in nearly all tropical and temperate countries; but it is impossible to determine where it is really indigenous. Collected by Dr. José Ramirez at Eslava 8,725 feet. Tizapan pedregal, Aug. 25.

COMPOSITÆ.112. *Dahlia coccinea* Cav. Ic., III, 33, t. 266.

Tizapan pedregal, 7,500–7,800 feet (228 a. See ante).

G. Contreras.

Contreras is a station on the Mexico, Cuernavaca and Pacific Railroad 17.5 miles from the City of Mexico. The following plants were collected while the train stopped.

PHYTOLACCACEÆ.113. *Phytolacca octandra* Linn. Sp. Pl., ed. II, 631; DC. Prodr., XIII, ii, 32; Biol. Centr. Amer. Bot., III, 30.

South Mexico and southward to Peru and Uruguay, and in the West Indies. Aug. 18 (114).

SOLANACEÆ.114. *Physalis pubescens* Linn. Sp. Pl., 183; Griseb. Fl. Br. W. Ind., 433; Biol. Centr. Amer., III, 420.

Generally dispersed in tropical America, Aug. 18 (113).

H. Eslava.

The Hacienda of Eslava and the village of that name are distant from the City of Mexico 19 miles. The pedregal, which

here reaches its northern limit, is elevated 2,500–3,500 metres (8,000–11,800 feet). The flora presents a greater richness than lower down, the region being protected from the cold winds, which blow over the valley, by the forests of oak and pine and by the high hills to the west and north. It is, therefore, warmer.

CONIFERÆ.

115. *Pinus leiophylla* Schlecht & Cham. in Linnæa, VI, (1832), 354; Biol. Centr. Amer. Bot., , III 187.

Collected by a number of botanists in different parts of Mexico. Peak of Orizaba, 7–9,000 feet (Linden); Pedregal and Cañada de Tizapan (Christy). Called "Pino;" "Ocotchino" by the Mexicans. Eslava pedregal 8–10,000 feet, Aug. 31 (396).

AMARYLLIDACEÆ.

116. *Agave megalacantha* Hemsl. Diag. Pl. Nov. Mex., 3, 55; Tab. LXXXVIII, A.

Eslava pedregal, 9,000 feet, Aug. 31 (400). (Collected by Bourgeau here).

CUPULIFERÆ.

117. *Quercus reticulata* Humb. Bonpl. Fl. Æquin., II, 40, t. 86; Biol. Centr. Amer. Bot., III, 176.

Collected in several parts of South Mexico. Peak of Orizaba, 8,000 to 10,000 feet (Liebmann); San Angel (Bourgeau), etc.; Eslava pedregal, 8–10,000 feet, Aug. 31 (394).

LEGUMINOSÆ.

118. *Lupinus sylvaticus* Hemsl. Biol. Centr. Amer. Bot., I, 231.

North and South Mexico, Valley of Mexico, Desierto Viejo (Bourgeau). Eslava pedregal, 9,000 feet, Aug. 31.

RHAMNACEÆ.

119. *Ceanothus azureus* Desf. Tabl. ed. II, 232; Biol. Centr. Amer. Bot., I, 199; Bot. Reg., t. 291.

Recorded from a number of localities in Mexico, and collected by Dr. José Ramirez at Eslava, 8,830 feet; a very ornamental plant in flower. "Sayolistle;" "Cuaicuastle." Eslava pedregal, 10,000 feet, Aug. 31 (393).

OROBANCHACEÆ.

120. *Conopholis Mexicana* A. Gray ex S. Wats. in Proc. Amer. Acad., XVIII, (1882–83), 131.

Really not distinct from *C. Americana* Wallr., which ranges from New England to Michigan and Florida. Eslava pedregal, 9,000 feet; parasitic on roots of oak. Aug. 31.

RUBIACEÆ.

121. *Crusea brachyphylla* Cham. & Schlecht in Linnæa, V, (1830), 165; Biol. Centr. Amer. Bot., II, 57.

South Mexico, peak of Orizaba at 7,000 feet; Eslava pedregal, 8-10,000 feet, Aug. 31 (399).

COMPOSITÆ.

122. *Dahlia Merckii* Lehm. Delect. Sem. Hort. Hamb. (1839), ex Linnæa, XIV, (1840) 130; Biol. Centr. Amer. Bot., II, 197.

North Mexico, region of San Luis Potosi, 6,000 to 8,000 feet (Parry & Palmer); South Mexico, Real de Monte (Coulter), summit of a mountain near Guadalupe (Bourgeau). This dahlia is one of the showy species; the color of its flowers runs from purple to pure white through the gradual fading out of the purple color. One most commonly sees in a state of nature the white heads, which are tinted with lavender or pale purple at the base of the ray floret. The heads in each case are nearly uniform in size, being about an inch and three-fourths across. (See an article of mine, "The Native Dahlias of Mexico," Science n. s., VI, 910, Dec. 17, 1897).

Eslava pedregal, Aug. 31; 10,000 feet.

123. *Dahlia coccinea* Cav. Ic., III, 33, t. 266.

Eslava pedregal, 10,000 feet, Aug. 31; (see ante).

124. *Dahlia variabilis* Desf. Cat. Hort. Par., ed. III, 182.

This dahlia is confined to the region around, including the Valley of Mexico. It is a most striking plant, growing from 5 to 6 feet tall, and bearing flowers ranging in color from purple to sulphur-yellow through the following gradations: lavender-purple, heliotrope, heliotrope-yellow (various shades of lighter and lighter hue approaching yellow), sulphur-yellow. The heads in which the ray florets are colored heliotrope-yellow, are in reality of an heliotrope color, the bases of the ligulate corolla being of a yellow color, shading off into heliotrope. They are broad (1 inch), long (2 inches) and ovate spatulate. See "The Native Dahlias of Mexico," (Science n. s., VI, 909, Dec. 17, 1897).

Eslava pedregal, 10,000 feet, Aug. 31 (390).

125. *Cosmos* sp.

Eslava pedregal, 9,000 feet, Aug. 31 (384).

126. *Stevia nudiflora*.

Eslava pedregal, 9,000 feet, Aug. 31 (385).

127. *Stevia* sp.

Eslava pedregal, 9,000 feet, Aug. 31 (386).

I. *La Cima. Summit of Sierra del Ajusco.*

La Cima is an Indian town 38 miles from the city of Mexico on the crest or summit of the Sierra del Ajusco at about 11,000 feet above sea level. It is, therefore, about 2,000 feet lower than the Cerro Grande del Ajusco, or volcanic cone (13,612 feet). It was from this extinct crater, that the great pedregal of Tlalpam and many of the smaller pedregals were formed by lava flows in prehistoric times. The pedregal of La Cima is lower than the town, which consists of a few adobe huts. It presents the same rugged features, as those of the great lava bed between San Angel and Tlalpam, which has been already fully described. Most of the plants mentioned in the accompanying list are from the hill overlooking and directly above the town on the east side of the railroad. The soil of this hill is of a rich black character and is marked by many foot paths running in every direction.

CONIFERÆ.

- 128. *Juniperus tetragona*** Schlecht in Linnæa, XII (1838) 495; DC. Prodr., XVI, ii, 491; Biol. Centr. Amer. Bot., III, 184.

Reported from North Mexico in the Sierra Madre to South Mexico and ascending on the peak of Orizaba to the limits of vegetation 12,000 to 14,000 feet. Pedregal, La Cima, Sierra del Ajusco, 11,000 feet, Aug. 18 (125).

- 129. *Pinus Montezumæ*** Lamb. Gen. Pin. ed., I, iii, 149, t. 64; Biol. Centr. Amer. Bot., III, 188.

A plant of many synonyms; it stretches from North to South Mexico, extending to timber line on Orizaba, Popocatepetl and Iztaccihuatl, 10–14,000 feet. La Cima, Sierra del Ajusco, 11,000 feet, Aug. 18 (126).

LILIACEÆ.

- 130. *Stenanthium frigidum*** Kunth. Enum., Pl. IV, 189 (1843); Biol. Centr. Amer. Bot., III, 381; Baker in Journ. Linn. Soc., XVII, 484.

South Mexico, peak of Orizaba 9,000 to 12,500 feet (Linden); Anganguio, 9,000 feet (Hartweg). Pedregal, La Cima, 10,000 feet, Aug. 18 (132).

- 131. *Anthericum* sp.**

Sierra del Ajusco. A plant with fascicled roots for storage of food, an inch, or two long. Aug. 18 (143).

IRIDACEÆ.

132. *Sisyrinchium Schaffneri* S. Wats. in Proc. Amer. Acad., XVIII, (1883) 160.

Sierra del Ajusco, Aug. 18 (144).

ORCHIDACEÆ.

133. *Microstylis tenuis* Wats.

La Cima, pedregal, Aug. 18 (117 specimen lost).

134. *Spiranthes aurantiaca* Hemsl. Biol. Centr. Amer. Bot., III, 300.

Reported from several stations in South Mexico. The specimens here were collected by Mr. John MacGlashen assistant to Mr. Pringle. La Cima, pedregal, Sierra del Ajusco, Aug. 18 (116).

PIPERACEÆ.

135. *Peperomia umbilicata* Ruiz and Pav. Fl. Per., I, 30, t. 45, f. b.; Biol. Centr. Amer. Bot., III, 66.

North to South Mexico, Colombia and Bolivia. The small tubers are of a piquant flavor resembling the true pepper (pimienta); hence, "Pimienta de tierra." Sierra del Ajusco, 11,000 feet, Aug. 18 (145).

SAXIFRAGACEÆ.

136. *Ribes Jorullense* H. B. & K. Nov. Gen. et Sp., VI, 61; Biol. Centr. Amer. Bot., I, 386.

Emetic properties are attributed to the roots of this plant, called "Saracuacho" by the Mexicans. La Cima, pedregal, Aug. 18 (124).

137. *Ribes microphyllum* H. B. & K. Nov. Gen. et Sp., VI, 62; Biol. Centr. Amer. Bot., I, 386.

La Cima, pedregal, 11,000 feet, Aug. 18 (115).

ONAGRACEÆ.

138. *Oenothera sinuata* Linn. Mant., II, 228; Biol. Centr. Amer. Bot., I, 454.

From the United States southward through Mexico. Sierra del Ajusco, 10,000 feet, Aug. 18 (138).

UMBELLIFERÆ.

139. *Eryngium montanum* Coult. & Rose.

La Cima, pedregal, Aug. 18 (112).

CORNACEÆ.

140. *Garrya laurifolia* Benth. Pl. Hartw., 14; Biol. Centr. Amer. Bot., I, 576.

Reported from a number of localities in North and South Mexico. A plant used medicinally. "El Cuauchichic;" "Chichicua-huitl." Sierra del Ajusco, Aug. 18 (147).

ERICACEÆ.

141. *Pernettya ciliaris* D. Don. ex. G. Don Gen. Syst., III, 837; Biol. Centr. Amer. Bot., II, 280.

A strong, low growing, woody shrub with ericaceous lanceolate leaves and red berries and strong root development. Said to be poisonous to sheep. La Cima, Sierra del Ajusco, Aug. 18 (133).

GENTIANACEÆ.

142. *Halenia parviflora* G. Don. Gen. Syst., IV, 177; Biol. Centr. Am. Bot., II, 352.

Distributed through Mexico to Colombia and Peru. La Cima, Sierra del Ajusco, Aug. 18 (137).

BORAGINACEÆ.

143. *Lithospermum angustifolium* Michx. Fl. Bor. Am., I, 130; Biol. Centr. Amer. Bot., II, 381.

Illinois to Wisconsin, southward to Texas and westward to Utah and Arizona, also in Mexico. La Cima, Sierra del Ajusco, Aug. 18 (136).

144. *Lithospermum distichum* Orteg. Hort. Matr., Dec. 8; Biol. Centr. Amer. Bot. II, 381.

South Mexico, peak of Orizaba, 11,000 to 12,000 feet (Galeotti). Sierra del Ajusco, Aug. 18 (146).

LABIATÆ.

145. *Salvia glechomaefolia* H. B. & K. Nov. Gen. et Sp., II, 290, t. 141; Biol. Centr. Amer. Bot., II, 556.

South Mexico between Guanajuato and Santa Rosa at about 8,800 feet (Humb. & Bonpl.). Sierra del Ajusco, Aug. 18 (142).

SOLANACEÆ.

146. *Nectouxia formosa* H. B. & K. Nov. Gen. et Sp., III, 10, t. 193.

Reported from various parts of Mexico. La Cima, Sierra del Ajusco, 11,000 feet, Aug. 18 (110).

147. *Solanum tuberosum* Linn. Sp. Pl., 185; Biol. Centr. Amer. Bot., II, 416.

"The potato is wild in Mexico, but whether really indigenous it is impossible to say. It is probable that more than one species was concerned in the parentage of the cultivated varieties. On the other hand, several tuberiferous *Solani* described by various authors as distinct species differ less from each other than the more distinct of the cultivated varieties." These plants in such an unfrequented place as the pedregal on top of a high mountain are probably wild.

Ejemplar silvestre recogido de la montaña. This plant was one foot high with purple flowers. Pedregal, La Cima, 10,000 feet, Aug. 18 (131).

148. *Solanum tuberosum* Linn. var. *boreale* Gray.

Sierra del Ajusco, Aug. 18 (140).

SCROPHULARIACEÆ.

149. *Castilleja angustifolia* Mart. & Gal. in Bull. Acad. Brux., XII, ii, (1845) 29; Biol. Centr. Amer. Bot., II, 460.

Sierra del Ajusco, Aug. 18 (123A).

150. *Castilleja tenuiflora* Benth. Pl. Hartw., 22.

Pedregal, La Cima, Aug. 18 (123).

151. *Pentstemon barbatus* Roth. Catalect. fasc., III, 49; Nutt. Gen. Am., II, 53.

Pentstemon coccineus Engelm. in Wislitz. Tour. North. Mex., 107 (Sketch, 23).

Colorado, New Mexico, North and South Mexico. La Cima, Sierra del Ajusco, 10,000 feet, Aug. 18 (104).

152. *Pentstemon imberbis* Trautv. in Bull. Sc. Petersb. V, (1839) 345; Biol. Centr. Amer. Bot., II, 445.

Reported by a number of botanists in North and South Mexico. La Cima, Sierra del Ajusco, Aug. 18 (104a).

153. *Pedicularis Mexicana* Zucc. ex Bunge, in Bull. Phys. Math. Acad. Petersb., I, (1843) 384.

Pedregal, La Cima, 11,000 feet, Aug. 18 (111).

CAPRIFOLIACEÆ.

154. *Symphoricarpos microphyllus* H. B. & K. Nov. Gen. et Sp. III, 424; Biol. Centr. Amer. Bot., II, 4.

North Mexico, region of San Luis Potosi to South Mexico. Pedregal, La Cima, Sierra del Ajusco, Aug. 18 (122).

COMPOSITÆ.

155. *Stevia serrata* Cav. Ic., IV, 33, t. 355; Biol. Centr. Amer. Bot., II, 89.

North Mexico, region of San Luis Potosi; South Mexico, near Tacubaya (Bourgeau). La Cima, pedregal, Aug. 18 (127).

156. *Stevia linoides* Sch. Bip. in Linnæa, XXV, (1852) 284.

The specimens collected are doubtfully referred to this species. La Cima, Sierra del Ajusco, Aug. 18 (128).

157. *Senecio Sanguisorbæ* DC. Prodr., VI, 427; Biol. Centr. Amer. Bot., II, 247.

A plant ranging from San Luis Potosi in North Mexico to Real del Monte in South Mexico. La Cima, Sierra del Ajusco, Aug. 18 (139).

158. *Dahlia Merokii* Lehm. Delect. Sem. Hort. Hamb., 1839; ex Linnæa, XIV, (1840) Litt., 130.

La Cima, pedregal, Aug. 18 (118, see ante).

159. *Gnaphalium Bourgovii* A. Gray in Proc. Amer. Acad., XIX, (1883) 3.

The plant is questionably referred to this species. South Mexico. A plant resembling *G. cheiranthifolium* Lam. La Cima, in railroad cut below the town. Aug. 18 (121).

J. Salazar and Sierra de las Cruces.

A brief description of this region is given in the introductory geographical portion. The region is one of great exposure to trying and cold winds, we, therefore, find a more truly alpine flora than at La Cima, although the elevations are about the same. This accounts for the presence at Salazar of low, caespitose, or dwarfed species.

A ditch along the railroad before reaching Salazar afforded many interesting plants. Las Cruces Valley, the scene of the battle in 1810 between Hidalgo and the Spaniards resulting in a victory for the patriots, yielded a great variety of plants. The level of the mountain meadows composing the valley is about 10,000 feet altitude. Many cold springs, render the district fine botanizing ground.

FILICES.

160. *Polypodium heteromorphum* Hook. et Grev. Ic. Fil., t. 108; Biol. Centr. Amer. Bot. III, 660.

Sides of ditches, Salazar, Sierra de las Cruces. Extending from South Mexico to Colombia and Ecuador. Aug. 13 (59).

GRAMINEÆ.

161. *Brachypodium Mexicanum* Linn. Hort. Berol., I, 41; Biol. Centr. Amer. Bot., III, 584.

North Mexico, region of San Luis Potosi (Virlet D'Aoust); South Mexico, Chapultepec and Tacubaya (Schaffner); Chinantla, San Felipè, (Liebmann).

Salazar, 10,000 feet, Sierra de las Cruces, Aug. 13 (32).

ERIOCAULONACEÆ.

162. *Eriocaulon* sp.

Boggy places, Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (50).

COMMELINACEÆ.

163. *Weldenia candida* Schult f. in Flora, XII, (1829) 3t., 1A.; C. B. Clarke in DC. Monogr. Phanerog., III, 319; Biol. Centr. Amer. Bot., III, 396.

South Mexico, between Chico and Real del Monte (Ehrenberg), Nevada de Toluca (Karwinski), Cuesta de Catinga (Schiede); Guatemala, Volcan de Agua at 14,000 feet (Hartweg). "Yerba de la rata." At base of *Abies religiosa*, Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (13).

164. *Commelina* sp.

Salazar, 10,000 feet, Aug. 13 (17a).

165. *Tradescantia* sp.

Salazar, 10,000 feet, Aug. 13 (24).

IRIDACEÆ.

166. *Sisyrinchium Schaffneri* S. Wats. in Proc. Amer. Acad., XVIII, (1883), 160; Biol. Centr. Amer. Bot., III, 330.

North Mexico, region of San Luis Potosi, (Schaffner, Parry & Palmer). Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (26).

URTICACEÆ.

167. *Urtica Breweri* S. Watson in Proc. Amer. Acad., X, (1875), 348.

Salazar, 10,000 feet, Aug. 13 (56).

PORTULACACEÆ.

168. *Claytonia perfoliata* Donn. Ind. Hort. Cant., 25, ex. Willd. Sp., Pl., I, 1,186; Bot. Mag., t. 1,336; Biol. Centr. Amer. Bot., I, 80.

Temperate North America to South Mexico. An annual succulent herb, serving for salad and also for spinach. The Indians of Mexico, eat it raw. "Qualite de venado." Salazar, Aug. 13 (55).

CARYOPHYLLACEÆ.

169. *Arenaria alsinoides* Willd. ex Schlecht in Ges. Naturf. Fr. Berl. Mag., VII, (1813), 201.

A. lanuginosa Rohrb. in Mart. Fl. Bras., XIV, ii, 274.

Common from North Carolina to Mexico, Central America, Peru and Bolivia also in the West Indies. Salazar, Aug. 13 (48).

170. *Arenaria decussata* Willd. ex Schlecht in Ges. Naturf. Fr. Berl. Mag., VII, (1813), 212; Biol. Centr. Amer. Bot., I, 70.

A dwarf alpine plant collected at Salazar, 1-2 inches high. North to South Mexico. Salazar, Aug. 13 (27).

171. *Cerastium viscosum* Linn. Sp. Pl. 437.

C. glomeratum Thuill. Fl. Par. ed., II, 226.

Salazar, 10,000 feet, Aug. 13 (16).

RANUNCULACEÆ.

172. *Thalictrum strigillosum* Hemsl. Diagn. Pl., Nov. 1; Biol. Cent. Am. Bot., I, 4.

T. Hernandezii Tausch in Presl. Rel. Hænk., II, 69.

South Mexico, rare in ravines among bushes (Schaffner), Tizapan, Valley of Mexico (Bourgeau), Zimapan (Coulter), mountains around Mitla, Oaxaca (Andrieux), between San Miguel and La Jaya (Schiede). The specimens collected by me are doubtfully referred to this species. A plant which is used as a diuretic and for kidney complaints. "El Cozticpatli." Salazar, Aug. 13 (76).

173. *Ranunculus stoloniferus* Hemsl. Diagn. Pl., Nov. 17; Biol. Centr. Amer. Bot., I, 8.

North to South Mexico. Salazar, 10,000 feet, Aug. 13 (11).

174. *Ranunculus dichotomus* Moc. & Sessé ex DC. Syst., I, 288; Biol. Centr. Amer. Bot., I, 6.

R. orthorynchus Hook. Fl. Bor. Am., I, 21, t. 9.

Recorded from a number of localities throughout Mexico. Salazar, 10,000 feet, Aug. 13 (54).

CRASSULACEÆ.

175. *Sedum Moranense* H. B. K. Nov. Gen. et Sp., VI, 44; Biol. Centr. Amer. Bot., I, 397.

"Siempreviva." Salazar, 10,000 feet, Aug. 13 (57).

ROSACEÆ.

176. *Potentilla candicans* Humb. & Bonpl. var. *nana* Nutt.

A plant confined to South Mexico. Its woody roots contain tannin. The plant contributes in a great part to the turf of the region. An alpine xerophyte. Salazar, 10,000 feet, Aug. 13 (72).

177. *Fragaria Mexicana* Schlecht in Linnæa, XIII, (1839), 265; Biol. Centr. Amer. Bot., I, 375.

F. vesca Linn. Sp. Pl., 494.

A strawberry distributed from North Mexico, where it is common in the Sierra Madre to South Mexico. Salazar, Aug. 12 (12).

LEGUMINOSÆ.

178. *Trifolium Schiedeanum* S. Wats. in Proc. Am. Acad., XVII, (1882), 339; Biol. Centr. Amer. Bot., IV, 25.

Distributed from North to South Mexico. Salazar, 10,000 feet, Aug. 13 (64).

179. *Trifolium involueratum* Ortega. Hort. Matr., Dec. 33; Willd. Sp. Pl., III, 1,372; Biol. Centr. Amer. Bot., I, 232.

A plant found in California, Colorado, New Mexico, extending to South Mexico. Salazar, 10,000 feet, Aug. 13 (70).

180. *Astragalus didymocarpus* Hook. Arn. Bot. Beech. Voy., 334.

Salazar, 10,000 feet, Aug. 31 (44).

181. *Astragalus reptans* Willd. Hort. Ber., II, 88, t. 88; Biol. Cent. Am. Bot., I, 266.

South Mexico, Tacubaya, Valley of Mexico (Bourgeau); Chapultepec (Bilimek). Salazar, Sierra de las Cruces, 11,000 feet, Aug. 13 (20).

GERANIACEÆ.

182. *Geranium* sp.

Salazar, 10,000 feet, Aug. 13 (65).

183. *Erodium cicutarium* L'Herit. ex Ait. Hort. Kew. ed., I, ii, 414; Biol. Centr. Amer. Bot., I, 161.

A plant widely dispersed in the north temperate regions of the Old World, and now exceedingly common in many parts of North America, but supposed to have been originally introduced by the Spaniards. Used as a fodder plant in Europe. Extends from North to South Mexico.

"Alfilaria"; "Storksbill"; "Pinclover"; "Pingrass"; "Pinweed"; "Filaria" "Filaree"; "Alfilarilla." Salazar, 10,000 feet, Aug. 13 (14).

184. *Oxalis violacea* Linn. Sp. Pl., 434.

Salazar, 10,000 feet, Aug. 13 (69).

185. *Oxalis corniculata* Linn. var. *repens* n. var. probably *O. repens* Thunb., Diss. Oxal., 16; Prod. Pl. Cap., 82.

This plant is found in nearly all (except the colder) parts of the world, varying very much. North Mexico to South Mexico, Guatemala and Nicaragua. Salazar, Aug. 13 (18).

LINACEÆ.

186. *Linum Mexicanum* H. B. & K. Nov. Gen. et Sp., VI, 39; Bot. Reg., t. 1,326; Biol. Centr. Amer. Bot., I, 143.

Abundant in South Mexico. Salazar, 10,000 feet, Aug. 13 (63).

EUPHORBIACEÆ.

187. *Euphorbia campestris* Cham. & Schlecht in Linnæa, V, (1830), 84; Biol. Centr. Amer. Bot., III, 92.

Collected by a number of botanists in South Mexico. Salazar, Aug. 13 (35).

VIOLACEÆ.

188. *Viola Grahami* Benth. Pl. Hartw., 35 ; Biol. Centr. Amer. Bot., I, 50.

North and South Mexico. Salazar, Aug. 13 (8, 15).

189. *Viola flagelliformis* Hemsl. Diagn. Pl., Nov. 20 ; Biol. Cent. Am. Bot., I, 50.

Salazar, 10,000 feet, Aug. 13 (15a).

ONAGRACEÆ.

190. *Epilobium Bonplandianum* H. B. & K. Nov. Gen. et Sp., VI, 95.

Salazar, Sierra de las Cruces, Aug. 13 (38).

191. *Fuchsia microphylla* H. B. & K. Nov. Gen. et Sp., VI, 103, Biol. Centr. Amer. Bot., I, 458.

Abundant in South Mexico. Growing along irrigating ditches, 11,000 feet. Salazar, Aug. 13 (30).

UMBELLIFERÆ.

192. *Angelica Pringlei* Coulter & Rose.

Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (45).

193. *Eryngium ranunculoides* Benth. Pl. Hartw., 38 ; Biol. Cent. Am. Bot., I, 562.

South Mexico in mountain pastures, Aganguio (Hartweg). Salazar, in mountain meadows, 10,000 feet, Aug. 13 (50a).

194. *Eryngium dilatatum* Lam. Encyc., IV, 755.

Salazar, 10,000 feet, Aug. 13 (50).

ERICACEÆ.

195. *Pyrola secunda* Linn. Sp. Pl., 396 ; Biol. Centr. Amer. Bot., II, 283.

South Mexico, peak of Orizaba, 8,000 to 10,000 feet (Liebmann), Desierto Viejo, Valley of Mexico (Bourgeau). Salazar, 10,000 feet, Aug. 13 (34).

LOGANIACEÆ.

196. *Buddleia Humboldtiana* Roem. & Schult. Syst., III, 93 ; Biol. Centr. Amer. Bot., II, 341.

From Southwest Texas and Southern New Mexico to Oaxaca. "En las cañadas y al margen de los arroyos. Se usa como forraje para las reses" (Ramirez). Salazar on mountain sides, 11,000 feet, Aug. 13 (29).

ASCLEPIADACEÆ.

197. *Asclepias* sp.

Salazar, Sierra de las Cruces, Aug. 13 (46).

LABIATÆ.

- 198. *Salvia fulgens*** Cav. Ic., I, 15, t. 23; Biol. Centr. Amer. Bot., II, 556; DC. Prodr., XII, 333.

South Mexico. Salazar, 10,000 feet, Aug. 13 (62).

- 199. *Salvia nana*** H. B. & K. Nov. Gen. et Sp., II, 289; Biol. Centr. Amer. Bot., II, 561; DC. Prodr., XII, 304.

North Mexico to Guatemala. Doubtfully referred to this. Salazar, 10,000 feet, Aug. 13 (71).

- 200. *Stachys coccinea*** Jacq. Hort. Schoenb., III, 18, t. 284; Biol. Centr. Amer. Bot., II, 571.

Texas to Arizona, North Mexico to Guatemala (Volcan de Fuego, 7,000 feet). Salazar, 10,000 feet, Aug. 13 (42).

- 201. *Stachys repens*** Mart. & Gal. in Bull. Acad. Brux., XI, ii, (1844), 194; Biol. Centr. Amer. Bot., II, 573; DC. Prodr., XII, 479.

South Mexico, Peak of Orizaba, 9,500 to 11,000 feet (Galeotti, Linden); Desierto Viejo (Bourgeau). Salazar, Sierra de las Cruces, Aug. 13 (43).

- 202. *Prunella vulgaris*** Linn. Sp. Pl., 600; DC. Prodr., XII, 410; Biol. Centr. Amer. Bot., II, 570.

This species is spread over the whole range of the genus in Europe, Asia, America and Australia. Salazar, 10,000 feet, Aug. 13 (25).

SOLANACEÆ.

- 203. *Physalis lobata*** Torr. in Ann. Lye. N. York, II, (1826), 226. A. Gray, Synop. Fl. N. Am., II, 233; Biol. Centr. Amer. Bot., IV, 75.

Colorado, Arizona, Texas—North Mexico, mountains west of Saltillo, Coahuila (Palmer). My specimen is doubtfully referred to this species. Salazar, 10,000 feet, Aug. 13 (51).

- 204. *Solanum tuberosum*** Linn. Sp. Pl., 185.

Salazar, away from highway and railroad along an irrigating ditch. 10,000 feet, Aug. 13 (53). (A plant 18 inches high, rough hispid with deep purple flowers, No. 61).

SCROPHULARIACEÆ.

- 205. *Sibthorpia Pitchinchensis*** H. B. & K. Nov. Gen. et Sp., II, 390, t. 175; Biol. Centr. Amer. Bot., II, 454.

South Mexico, Vera Cruz to Orizaba (Müller), Zimapan (Coulter), Valley of Mexico (Bourgeau), peak of Orizaba, 9,000 to 12,000 feet (Galeotti, Linden), Cordillera of Oaxaca at 9,000 feet (Galeotti). Colombia to Peru, Bolivia and Argentina. Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (47).

206. *Castilleja tenuiflora* Benth. Pl. Hartw., 22; Biol. Centr. Amer. Bot., II, 463.

Salazar, 10,000 feet, Aug. 13 (68).

207. *Castilleja Schaffneri* Hemsl. Biol. Centr. Amer. Bot., II, 462, tab. LXIII, B., figs. 7-13.

A small alpine plant 2 inches high. Salazar, 10,000 feet, Aug. 13 (17).

208. *Mimulus luteus* Linn. Sp. Pl., ed. II, 884; DC. Prodr., X, 370; Bot. Mag., t. 150, 3,336, 3,363; Biol. Centr. Amer. Bot., II, 449.

A variable species common in Western America, from the Aleutian Islands and Alaska, through Mexico and along the Andes to South Chili. Also naturalized in some parts of the Old World (Hemsley). Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (65a).

209. *Pentstemon campanulatus* Willd. Sp. Pl., III, 228; DC. Prodr., X, 326; Biol. Centr. Amer. Bot., II, 444; Bot. Mag., t. 1,878 ett. 3,884.

South Mexico, very common. Salazar, Sierra de las Cruces. In fir forests at about 10,000 feet, Aug. 13 (31).

PLANTAGINACEÆ.

210. *Plantago Patagonica* Jacq. Ic. Pl. Rar., II, 9, t. 306; Coll. Suppl., 35.

The specimens collected are doubtfully referred to this species. They may be *P. Mexicana* Link. (Enum. Hort. Berol., I, 121). Salazar, 10,000 feet, Aug. 13 (9).

211. *Plantago hirtella* H. B. & K. Nov. Gen. et Sp., II, 229, t. 127. A. Gr., Synop. Fl. N. Am., II, 392; Biol. Centr. Amer. Bot., II, 575.

Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (40).

RUBIACEÆ.

212. *Houstonia Palmeri* A. Gray. Proc. Amer. Acad., XVII, (1881-'82), 202; Biol. Centr. Amer. Bot., IV, 47.

A small alpine plant. Salazar, 11,000 feet, Aug. 13 (23).

LOBELIACEÆ.

213. *Lobelia nana* H. B. & K. Nov. Gen. et Sp., III, 317, t. 272; DC. Prodr., VII, 379; Biol. Centr. Amer. Bot., II, 268.

South Mexico, near Real del Monte and Moran, at about 8,000 feet (Humboldt & Bonpland), Vera Cruz to Orizaba (Müller), peak of Orizaba, 11,000 to 12,500 feet (Linden). A small plant, alpine in habit. Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (23).

214. *Lobelia fulgens* Willd. Hort. Berol., t. 85.

Salazar, Aug. 13. Collected also at Lake Xochimilcho (ante). (77).

COMPOSITÆ.

215. *Gnaphalium purpureum* Linn. Sp. Pl., 854.

Salazar, Sierra de las Cruces, 10,000 feet, Aug. 13 (6).

216. *Eupatorium Popocatepetlense* Schlecht. ex Hemsl. Biol. Centr. Am. Bot., II, 99 nomen.

North Mexico, region of San Luis Potosi, 6,000 to 8,000 feet (Parry & Palmer); South Mexico, Chiápas (Ghiesbreght). Salazar, 10,000 feet, Aug. 13 (31).

217. *Eupatorium pycnocephalum* Less. in Linnæa, VI, (1831), 404.

Salazar, 10,000 feet, Aug. 13 (39).

218. *Senecio* (*Cacalia*) *silphifolia* n. sp.

A plant resembling greatly in habit our western American Compass-plant *Silphium laciniatum* with large leaves which stand vertically at various angles. The plant bears an upright corymb of flowers. Named here tentatively, because, it has been probably named and distributed with Pringle's plants of 1896. Salazar, 10,500 feet in meadows, Aug. 13 (28).

ORIZABA AND CORDOBA.

Orizaba (4,000 feet) and Cordoba (2,700 feet) on the line of the Mexican Railroad (Ferro-Carril Mexicano) can be treated of together. Orizaba is a town of 15,000 inhabitants, 82 miles from Vera Cruz and 181 miles from the City of Mexico. The town lies in a little valley surrounded by very fine mountains. The peak of Orizaba, however, cannot be seen, save a tiny strip of glittering white over the crest of the Cerro de la Escamela. The other surrounding hills are: the Barrego; the Ranchito de Cristo; Jala-pilla; San Juan del Rio; the Rincon Grande; and La Perla. The town is composed, for the most part, of low houses with red-tiled roofs; it is crossed by two small streams, and by the little river Orizaba (through a rocky ravine filled with tropical plants), all of which unite near by in the River Blanco, which plunges over a precipice in a cascade in the Rincon Grande. The valley alone was explored botanically during the short time at the disposal of the writer. The several ravines were followed through the town to the outskirts, when circling the town, the fields and copses and woods were investigated for the plants that might be in flower. Most of the larger trees were found to be loaded down with epiphytes, orchids, tillandsias, and mistletoe with several ferns. To one who

for the first time visits a tropical country, the very wealth of the material completely nonplusses him for a time. The region abounds in orchids. Only the smaller forms were collected although many fine large ones were seen. A botanist is at once impressed with the luxuriance of the epiphytic growths. A hasty visit was also paid to the Rincon Grande, where a number of plants were collected within the influence of the spray of the water-fall.

Only two hours were spent at Cordoba, between trains, so that only a most hasty and superficial collection of plants was made of the flora of this most interesting tropical region.

FILICES.

219. *Adiantum Capillus-Veneris* Linn. Hook. Sp. Fil., II, 36; Biol. Centr. Amer. Bot., III, 607.

A plant very widely diffused in temperate regions, throughout the world including the mountains of Mexico, where it occurs up to an altitude of 10,000 feet on the peak of Orizaba. Orizaba, Aug. 27 (363).

220. *Polypodium aureum* Linn. Hook. Sp. Fil. V, 16; Biol. Centr. Amer. Bot., III, 655.

A fern extending from Florida southward in Mexico to Brazil. The specimens collected by me were found in the forks of trees. Orizaba, Aug. 27 (369).

221. *Nephrolepis cordifolia* Presl. Hook. et Bak. Syn. Fil., 300; Biol. Centr. Amer. Bot., III, 652.

South Mexico to Brazil and Peru, also in Cuba. Orizaba, Aug. 27 (356).

LILIACEÆ.

222. *Schoenocaulon officinale* A. Gray in Benth. Pl. Hartw., 29; Biol. Centr. Amer. Bot., III, 383.

South Mexico to Guatemala and Venezuela. Slopes of El Borrego, abundant. Orizaba, Aug. 27 (4,500 feet), (349).

ORCHIDACEÆ.

223. *Cypripedium irapeanum* La Llave Lex. Nov. Veg. Desc. fasc., II (Orch. Opusc.) 10; Biol. Centr. Amer. Bot., III, 307.

C. molle Lindl. in Benth., Pl. Hartw., 72.

South Mexico to Guatemala. Slopes of hills near waterfall in Rincon Grande. Orizaba, Aug. 27; flowers yellow, (328).

224. *Epidendrum virens* Lindl. & Paxt. Flow. Gard., I, (1850-51), 152; Biol. Centr. Amer. Bot., III, 242.

The living specimens collected and brought home, I doubtfully refer them to this species. Orizaba, Aug. 27 (394).

PIPERACEÆ.

225. *Piper umbellatum* Linn. Sp. Pl., 30; Biol. Centr. Amer. Bot., III, 56.

South Mexico, southward to Peru and Brazil, also in West Indies. Cordoba, Aug. 26 (346).

226. *Piper* sp.

Orizaba, Aug. 27 (371).

CARYOPHYLLACEÆ.

227. *Silene Armeria* Linn. Sp. Pl., 420.

Orizaba, Aug. 27 (366).

ANONACEÆ.

228. *Anona Cherimolia* Miller Gard. Dict. ed. VIII, n. 5; Biol. Centr. Amer. Bot., I, 18; Bot. Mag., t. 2,011.

Extending from South Mexico to Ecuador and Peru; widely spread in Tropical America. Naturalized in some of the West Indian Islands according to Grisebach.

“One of the ‘Custard Apples.’ This shrub or tree might be tried in frostless forest valleys where the humidity and rich soil will prove favorable to its growth. It is hardy in the wildest coast regions of Spain, also in Chili. In Jamaica it is cultivated up to 5,000 feet.” (Mueller). Orizaba, Aug. 27 (380).

LEGUMINOSÆ.

229. *Mimosa albida* H. & B. in Willd. Spec., IV, 1,030.

Cordoba, Aug. 26 (350). “Sensitive Plant.”

MALVACEÆ.

230. *Malvaviscus arboreus* Cav. Diss., III, t. 48; Biol. Centr. Amer. Bot., I, 118.

North Mexico to Guatemala, Panama; also common in the West Indies including Cuba. Orizaba, Aug. 27 (362).

CACTACEÆ.

231. *Cereus triangularis* Mill. Gard. Dict. ed. VIII, n. 9; Bot. Mag., t. 1,834; Biol. Centr. Amer. Bot., I, 547.

Orizaba, Aug. 27.

232. *Phyllocactus grandis* Lem. in Fl. des Serres, III, (1847), 255, verso.

Mexico, region of Orizaba, Honduras. Orizaba in Rincon Grande, Aug. 27 (373).

MYRTACEÆ.

233. *Psidium Guajava* Linn. Sp. Pl., 470; Biol. Centr. Amer. Bot., I, 406.

From the West Indies and Mexico to South Brazil. "This handsome evergreen and useful bush should engage universal attention anywhere in warm lowlands, for the sake of its aromatic wholesome berries, which attain the size of a hen's egg, and can be converted into a delicious jelly. The pulp is generally cream colored or reddish, but varies in the many varieties which have arisen in culture, some of them bearing all the year round. Propagation is easy from suckers, cuttings or seeds. This big shrub is easily held under control in extra-tropic countries, but in the warmest and moistest tropical regions it may become irrepressible, as it spreads readily from suckers, and gets disseminated by birds and cattle easily." (Mueller). Orizaba, Aug. 27 (367).

ARALIACEÆ.

234. *Dendropanax arboreum* Deene. & Planch, Rev. Hort., ser. IV, iii (1854), 107.

This species has a wide range in the West Indies and tropical South America. "Vibona," (Cuba). Orizaba, Aug. 27 (353).

ASCLEPIADACEÆ.

235. *Gonolobus erianthus* Deene. in DC. Prodr., VIII, 592; Biol. Centr. Amer. Bot., II, 331.

The specimens collected by me are more hairy than those distributed by Pringle. It is possible that they are to be referred to *G. atratus* Gray with broader leaves, but the same pubescence. South Mexico to Guatemala. Orizaba, Aug. 27 (364).

VERBENACEÆ.

236. *Duranta Plumieri* Jacq. Select. Am., 186, t. 176, f. 76; Biol. Centr. Amer. Bot., II, 538.

A shrub 8 to 12 feet high in rough rocky woods, not uncommon from Florida through South Mexico to Peru, Brazil and in the West Indies. "Violetina" (Cuba). Orizaba, Aug. 27 (352).

237. *Lantana camara* Linn. Sp. Pl., 874; DC. Prodr., XI, 598; Biol. Centr. Amer. Bot., II, 527.

Georgia, Florida, Texas, Mexico, and generally dispersed in tropical South America and West Indies. "Filigrana" (Cuba). Orizaba, Aug. 27 (358).

CUCURBITACEÆ.

238. *Sechium edule* Swartz. Fl. Ind. Occ., II, 1,150; Biol. Centr. Amer. Bot., I, 491.

"The large, starchy root of this climber can be consumed as a culinary vegetable, while the good-sized fruits are also edible. The fruit often germinates before it drops. The plant bears, even in the first year, and may ripen one hundred fruits a year. Cultivated up to 5,000 feet in Jamaica" (Mueller).

South Mexico, Santa Anita near Mexico (Bourgeau), Orizaba (Botteri), valley of Cordova (Bourgeau); Panama, without locality (Seemann); West Indies and Tropical South America. "Chow-Chow" (Jamaica); "Chocho," "Chayota" (Mexico).

COMPOSITÆ.

239. *Senecio grandifolius* Less. in Linnaea, V, (1830), 162; Biol. Centr. Amer. Bot., II, 240.

South Mexico, region of Orizaba (Botteri, Bourgeau), valley of Cordova (Bourgeau), Montecinos, Vera Cruz (Linden).

Orizaba, Aug. 26th (360).

ADDENDA

(with families omitted).

240. *Thalia dealbata* Fras. Thal. dealbata, t. I; Bot. Mag., t. 1,690; Biol. Centr. Amer. Bot., III, 310.

Along ditches of Mexican Central R. R., near Guadalajara.

241. *Nymphaea gracilis* Zucc. in Abh. Akad. Muench., I (1832), 362; Biol. Centr. Amer. Bot., I, 25.

"A Mexican species of great merit, has large, handsome, star-shaped white flowers, which are borne on stout stems well above the foliage. It is worthy of note as being the only white day-blooming tropical or tender species; a very vigorous plant, free-flowering, the flowers possessing a delicate fragrance, resembling Lily of the Valley" (1897), Tricker, The Water Garden, p. 90, fig. on p. 91 and pl. III. South Mexico, lakes near Oaxaca, 5,000 feet (Galeotti), Mexico (Karwinski), ditches at Tacubaya, Valley of Mexico (Bourgeau), Aguas Calientes (Hartweg).

In ponds along Mexican Central R. R. near Guadalajara.

242. *Talinum Greenmanii* Harshberger in Bull. Torrey Bot. Club, XXIV, 183, Apr. 24, 1897, Plate 299, Fig. 4.

Volcanic gravel, Sierra del Ajusco, Mexico, 8,500 feet. Possibly it is *T. humile* described by E. L. Greene. Pringle *Plantæ mexicanæ*,

No. 6,472. Named in honor of Jesse Moore Greenman, of the Gray Herbarium, Cambridge, Mass.

243. *Agave Americana* Linn. Sp. Pl., 323.

A plant extensively cultivated throughout Mexico for its fibre and for the juice which yields, upon fermentation, the national beverage, pulqué.

244. *Taxodium mucronatum* Tenore in Ann. Sc. Nat. sér. III, xix, (1853), 355.

A tree found reaching gigantic girth in several parts of Mexico. The grove of Mexican cypresses below the Castle of Chapultepec being noted for the size of the individual species composing it. Two notable trees are found in it, one 19½ feet in diameter, the other, the tree of Montezuma, 14 feet in diameter. Another gigantic specimen is found at Tule on the road from Oaxaca to Guatemala, circumference, five feet from ground, 146 feet; longest diameter, 40 feet; shortest diameter of the trunk, 20 feet. This tree was also met with at Las Canoas on the Tampico branch of the Mexican Central Railroad. "Ahuehuete."

245. *Zea Mays* Linn. × ***Euchlaena Mexicana*** Schrad. *Zea Mays* Linn., Sp., pl. 971. *Euchlaena Mexicana* Schrad. Ind. Sem. Hort. Gotting (1832).—Cf. *Linnaea* viii (1833) Litt. 25.

The hybrids of these two plants throw considerable light upon the origin of our cultivated maize. I would refer the student to several papers upon this subject by the writer, as follows:

1. Maize: A Botanical and Economic Study. Contrib. Botan. Lab. University of Penna., I, pp. 75–202, with 4 plates. A Spanish translation of the entire paper appeared in Mexico, entitled "El Maiz: Estudio Botánico y Económico" (1894), pp. 164.

2. Fertile Crosses of Teosinthe and Maize. Garden and Forest, IX, p. 522.

3. Notes on the Hybrid of Maize and Teosinthe. Garden and Forest, X, p. 48.

4. The Uses of Plants Among the Ancient Peruvians. Bull. of the Museum of Science and Art, University of Penna., I.